

JOHN J. MULLANEY
JOHN H. MULLANEY, P.E.

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MULLANEY ENGINEERING, INC.

9049 SHADY GROVE COURT
GAIITHERSBURG, MD 20877

301 921-0115

ENGINEERING EXHIBIT EE-HEA:

**JOINT ENGINEERING EXHIBIT
MM DOCKET 93-107
CH. 280A - WESTERVILLE, OHIO**

JUNE 21, 1993

**FINAL ENGINEERING STATEMENT IN SUPPORT OF
AN ANALYSIS OF THE POPULATIONS & AREAS
AND THE NUMBER OF OTHER EXISTING AURAL SERVICES
SERVED BY EACH OF THE SIX REMAINING APPLICANTS**

SEARCHED INDEXED SERIALIZED FILED
JUN 22 1993

Federal Communications Commission	
Docket No.	93-107 Exhibit No. <u>ITI</u> ✓
Presented by	<u>ASF</u>
Disposition	Identified <u>8/20/</u>
	Received <u>8/20</u>
	Rejected _____
Reporter	<u>BARBARA LORD</u>
Date	<u>8/20/93</u>

MULLANEY ENGINEERING, INC.

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NM DOCKET 93-107
CH. 280A - WESTERVILLE, OHIO**

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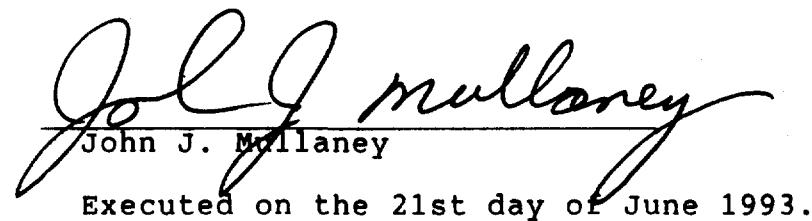
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MULLANEY ENGINEERING, INC.

DECLARATION

I, John J. Mullaney, declare and state that I am a graduate electrical engineer with a B.E.E. and my qualifications are known to the Federal Communications Commission, and that I am an engineer in the firm of Mullaney Engineering, Inc., and that firm has been retained by all six of the remaining mutually exclusive applicants for FM Channel 280A at Westerville, Ohio, to prepare an exhibit evaluating the standard comparative coverage issues.

All facts contained herein are true of my own knowledge except where stated to be on information or belief, and as to those facts, I believe them to be true. I declare under penalty of perjury that the foregoing is true and correct.


John J. Mullaney
Executed on the 21st day of June 1993.

MULLANEY ENGINEERING, INC.

ENGINEERING EXHIBIT EE-HEA:

**JOINT ENGINEERING EXHIBIT
MM DOCKET 93-107
CH. 280A - WESTERVILLE, OHIO**

NARRATIVE STATEMENT:

I. GENERAL:

This engineering statement has been prepared on behalf of all six of the remaining mutually exclusive applicants for Ch. 280A at Westerville, Ohio - MM Docket 93-107. This exhibit specifically addresses the standard comparative coverage issue.

The applicants are number as follows:

- A - David A. Ringer
- B - ASF Broadcasting Corporation
- C - Wilburn Industries, Inc.
- D - Shellee F. Davis
- E - Westerville Broadcasting Company
- F - Ohio Radio Associates

The technical parameters used for each applicant was supplied by their respective attorney. This data was compared to the FCC Engineering data base for the end of May 1993 and was found to be in agreement. Applicants A-D are located at Site I while applicants E & F are at Site II (see maps).

II. ENGINEERING DISCUSSION:

A. Coverage Areas:

Figure 1 is a map which illustrates the coverage areas of each of the six competing applicants. Figures 1-A to 1-F are the coverage tabulations for each respective applicant. The tabulation provides the geographic coordinates, center of radiation AMSL, terrain average, HAAT and specific power for 40 bearings (36 evenly spaced at 10 degrees). While not shown, all FM coverages are based upon 360 radials.

WITHIN 60 dBu or 1.0 mV/M CONTOUR

APPLICANT	POPULATION (1990)	AREA (SQ.KM)
SITE I		
A. DAVID A. RINGER	604,567	2,363
B. ASF BCG. CORP.	607,783	2,052
C. WILBURN IND.	404,608	1,828
D. SHELLEE F. DAVIS	629,837	2,319
SITE II		
E. WESTERVILLE BCG CO	597,617	2,476
F. OHIO RADIO ASSOC.	597,617	2,476

B. Other Aural Services:

Figure 2 is a map which overlays the other existing aural (FM & AM) services over the proposed coverages of the six competing applicants. Figure 2-A & 2-B are tabulations of FM and AM stations.

Appendix I of this exhibit provides a coverage tabulation for each of the other existing FM or AM facility determined to provide service to this area. Of the five AM facilities contained in the appendix only WCLT & WRFD have been specifically shown on the map. This is because as non-directional facilities their coverage is based upon the FCC M-3 Conductivity Map. However, since WBNS,

WOSU & WTVN provide a theoretical 2.0 mV signal over the entire area there is little doubt that even with the use of their measured conductivities that they would provide at least a 0.5 mV signal to the entire area.

C. Under-served Populations & Areas:

Figure 3 is a plot (without a map) of the other existing aural services and the six competing applicants. When first considering only other existing FM stations, the analysis indicates that at best Applicants E & F serve an area that has 3 or 4 existing full-time aural services. The areas which are under-served (less than 5 existing FM services) are east of Sites I & II. The Village of Utica marks the eastern most edge of the under-served area (Utica currently receives only 3 full-time services).

It has been determined that at least five existing AM daytime 0.5 mV/m signals will serve the entire areas proposed to be served by any of the competing applicants. However, there are no AM nighttime stations providing interference free service to the "under-served" areas discussed in the preceding paragraph.

Consequently, Applicants E & F will provide a new fourth or fifth service to those under-served areas at nighttime. All of the remaining four competing applicants provide no better than a sixth nighttime service to any portion of their proposed service areas. None of the six competing applicants provide a new daytime service to an under-served area.

The term "under-served" area refers to an area which receives service from less than five existing aural services.

*****		APPLICANTS E & F	*****
NUMBER OF EXISTING SERVICES		POPULATION (1990)	AREA (SQ.KM)
2		0	0
3		183	19
4		2,251	61
5 or More		595,183	2,396

D. Technical Computations:

FM Facilities

Terrain profile data for all FM facilities was extracted from NGDC 30 Second Digitized Terrain Data Base provided out of Boulder, Colorado. Three hundred-sixty bearings (every 1 degree) was used to obtain the proposed coverage data. The standard eight bearings (every 45 degrees) was used to obtain the HAAT. The primary service contour for FM stations regardless of class is the 60 dBu. Both educational and commercial stations have been considered.

The predicted FM service contours were computed using a mathematical model adapted for computer use of the data shown in Figure 1 of Section 73.333. This is the Commission's computer program TV FM FS REPORT RS-76-01, dated January 1976.

AM Facilities

All AM coverages are based upon the use of the FCC M-3 Conductivity Map. Seventy-two equally spaced bearings were used to determine the coverage contours. Daytime AM coverage requires 0.5 mV/m to populated places with less than 2500 persons and 2.0 mV/m to populated places with more than 2500 persons. Nighttime coverage requires an

interference free signal level (typically greater than 5.0 mV/m). In determining nighttime limits the contributions of co-channel & first adjacent channels stations were considered in accordance with the rules.

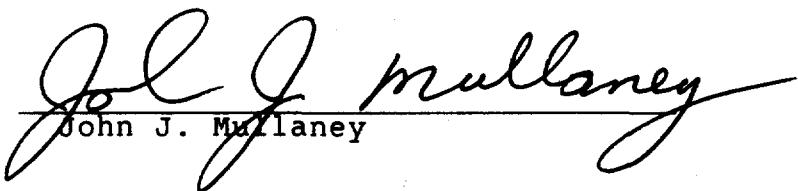
Coverage Area and Population

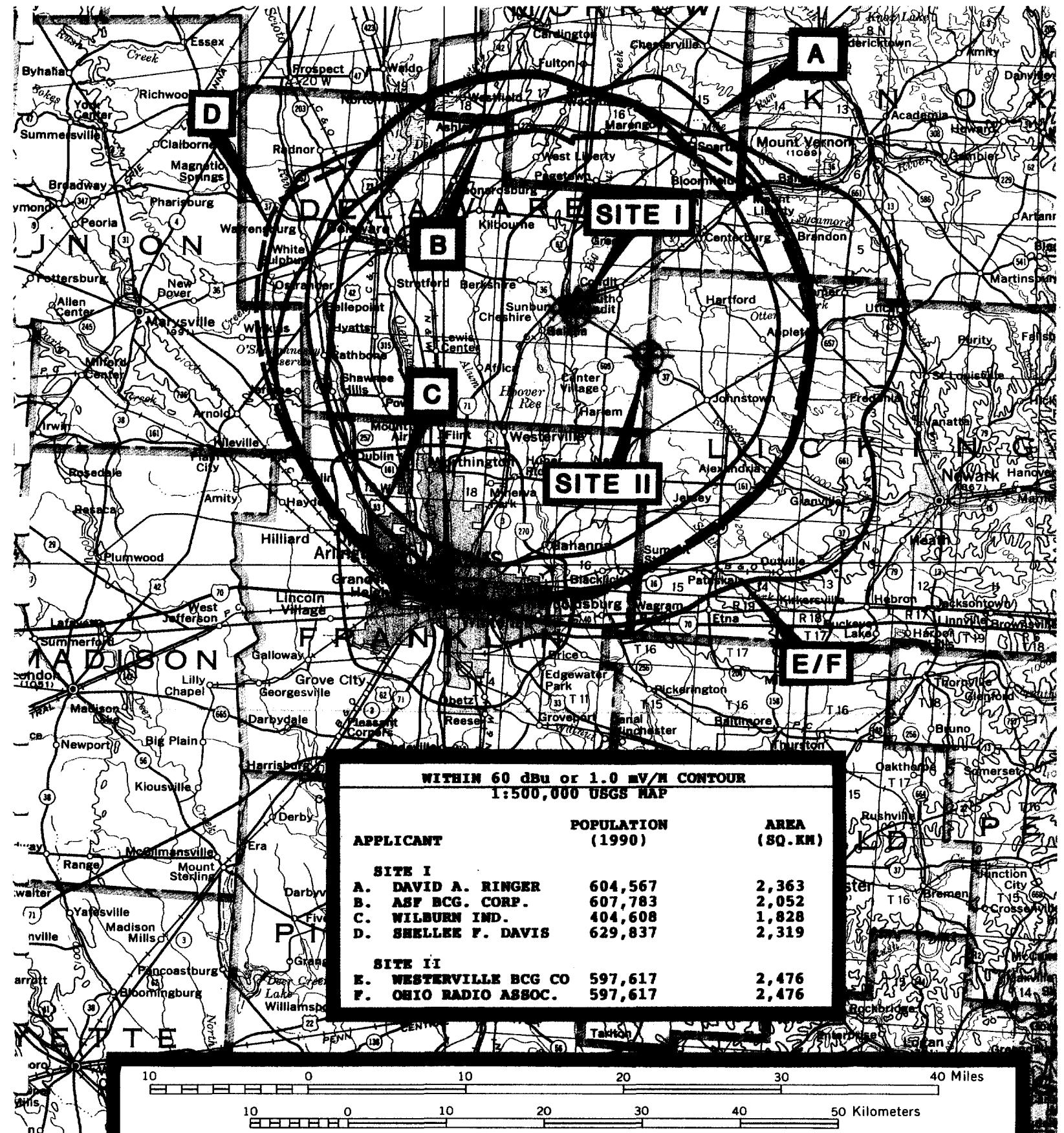
All area computations were determined mathematically. The population within contours was obtained through a computerized analysis of the census designated places population data contained in the 1990 Census.

III. SUMMARY:

Applicants E & F will provide during nighttime hours to the under-served coverage areas identified herein a new fourth service to 183 persons and a new fifth service to 2,251 persons. All of the remaining four competing applicants provide no better than a sixth nighttime service to any portion of their proposed service areas. None of the six competing applicants provide a daytime service to an under-served area.

June 21, 1993.


John J. Mullaney



COMPETING 60 dBu CONTOURS
JOINT ENGINEERING EXHIBIT
MM DOCKET 93-107
Ch. 280A - WESTERVILLE, OHIO

MULLANEY ENGINEERING, INC.
GAITHERSBURG, MARYLAND

FIGURE 1
JUNE 1993

COVERAGE TABULATION - COMPETING APPLICANTS
MM DOCKET 93-107

MULLANEY ENGINEERING, INC.

FM COVERAGE

DAVID A. RINGER - WESTERVILLE, OH

CHANNEL NO. 280 A FREQUENCY 103.9 MHZ
CENTER OF RADIATION 430.0 METERS AMSL
COORDINATES: 40-14-04 / 82-50-20
MAXIMUM ERP 4.3 KW-DA MAKE: ODD MODEL: ODD911230MA

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM)
0.	*	324.9	105.1	23.0
10.		330.5	99.5	23.5
20.		336.5	93.5	25.4
30.		344.0	86.0	24.5
40.		351.2	78.8	23.5
45.	*	353.4	76.6	23.2
50.		352.0	78.0	23.3
60.		352.8	77.2	23.2
70.		351.9	78.1	23.3
80.		349.3	80.7	23.7
90.	*	344.5	85.5	24.3
100.		343.4	86.6	24.5
110.		340.2	89.8	24.9
120.		333.9	96.1	25.7
130.		330.8	99.2	26.2
135.	*	330.3	99.7	26.2
140.		330.5	99.5	26.2
150.		328.2	101.8	26.6
160.		323.5	106.5	27.0
170.		312.5	117.5	28.2
180.	*	304.0	126.0	29.0
190.		297.2	132.8	29.6
200.		277.1	152.9	31.7
210.		272.6	157.4	32.2
220.		275.1	154.9	31.9
225.	*	275.7	154.3	31.9
230.		276.8	153.2	31.7
240.		280.6	149.4	31.4
250.		281.0	149.0	31.4
260.		279.8	150.2	31.4
270.	*	277.4	152.6	31.7
280.		277.3	152.7	31.7
290.		278.2	151.8	31.5
300.		281.3	148.7	29.6
310.		282.7	147.3	26.6
315.	*	283.5	146.5	26.6
320.		284.6	145.4	26.4
330.		290.7	139.3	25.9
340.		301.9	128.1	25.1
350.		308.3	121.7	24.5
AVERAGE (8) *		311.7	118.3 Meters	

COVERAGE TABULATION - COMPETING APPLICANTS
MM DOCKET 93-107 FIGURE 1-B

MULLANEY ENGINEERING, INC.

FM COVERAGE

ASF BCG. CORP. - WESTERVILLE, OH

CHANNEL NO. 280 A FREQUENCY 103.9 MHZ
CENTER OF RADIATION 421.0 METERS AMSL
COORDINATES: 40-14-04 / 82-50-20
MAXIMUM ERP 5. KW-DA MAKE: ODD MODEL: ODD911230MB

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM)	
				*****	60.0
0.	*	324.9	96.1	0.946	17.9
10.	330.5	90.5	1.152		18.2
20.	336.5	84.5	1.513		18.8
30.	344.0	77.0	2.048		19.5
40.	351.2	69.8	2.813		20.0
45.	*	353.4	67.6	3.248	20.4
50.	352.0	69.0	3.698		21.2
60.	352.8	68.2	4.512		22.2
70.	351.9	69.1	4.901		22.7
80.	349.3	71.7	5.000		23.2
90.	*	344.5	76.5	5.000	24.0
100.	343.4	77.6	5.000		24.1
110.	340.2	80.8	5.000		24.6
120.	333.9	87.1	5.000		25.4
130.	330.8	90.2	5.000		25.9
135.	*	330.3	90.7	5.000	25.9
140.	330.5	90.5	5.000		25.9
150.	328.2	92.8	5.000		26.2
160.	323.5	97.5	5.000		26.9
170.	312.5	108.5	5.000		28.2
180.	*	304.0	117.0	5.000	29.1
190.	297.2	123.8	5.000		29.8
200.	277.1	143.9	5.000		31.9
210.	272.6	148.4	5.000		32.5
220.	275.1	145.9	5.000		32.2
225.	*	275.7	145.3	5.000	32.0
230.	276.8	144.2	5.000		32.0
240.	280.6	140.4	5.000		31.5
250.	281.0	140.0	4.901		31.4
260.	279.8	141.2	4.512		30.9
270.	*	277.4	143.6	3.698	29.8
280.	277.3	143.7	2.813		27.8
290.	278.2	142.8	2.048		25.9
300.	281.3	139.7	1.513		24.0
310.	282.7	138.3	1.152		22.5
315.	*	283.5	137.5	1.040	21.9
320.	284.6	136.4	0.946		21.4
330.	290.7	130.3	0.800		20.1
340.	301.9	119.1	0.800		19.3
350.	308.3	112.7	0.800		18.7
AVERAGE (8) *	311.7	109.3 Meters			

COVERAGE TABULATION - COMPETING APPLICANTS
MM DOCKET 93-107
FIGURE 1-C

MULLANEY ENGINEERING, INC.

FM COVERAGE

WILBURN IND., INC. - WESTERVILLE, OH

CHANNEL NO. 280 A FREQUENCY 103.9 MHZ
CENTER OF RADIATION 422.0 METERS AMSL
COORDINATES: 40-14-04 / 82-50-20

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM)

0.	*	324.9	97.1	22.9
10.		330.5	91.5	22.2
20.		336.5	85.5	21.6
30.		344.0	78.0	20.6
40.		351.2	70.8	19.6
45.	*	353.4	68.6	19.3
50.		352.0	70.0	19.5
60.		352.8	69.2	19.3
70.		351.9	70.1	19.5
80.		349.3	72.7	19.8
90.	*	344.5	77.5	20.4
100.		343.4	78.6	20.6
110.		340.2	81.8	21.1
120.		333.9	88.1	21.9
130.		330.8	91.2	22.2
135.	*	330.3	91.7	22.2
140.		330.5	91.5	22.2
150.		328.2	93.8	22.5
160.		323.5	98.5	23.0
170.		312.5	109.5	24.3
180.	*	304.0	118.0	25.1
190.		297.2	124.8	25.6
200.		277.1	144.9	27.4
210.		272.6	149.4	27.7
220.		275.1	146.9	27.5
225.	*	275.7	146.3	27.4
230.		276.8	145.2	27.4
240.		280.6	141.4	27.0
250.		281.0	141.0	27.0
260.		279.8	142.2	27.0
270.	*	277.4	144.6	27.2
280.		277.3	144.7	27.4
290.		278.2	143.8	27.2
300.		281.3	140.7	26.9
310.		282.7	139.3	26.9
315.	*	283.5	138.5	26.7
320.		284.6	137.4	26.7
330.		290.7	131.3	26.2
340.		301.9	120.1	25.3
350.		308.3	113.7	24.6
AVERAGE (8) *		311.7	110.3 Meters	

COVERAGE TABULATION - COMPETING APPLICANTS
MM DOCKET 93-107

FIGURE 1-D

MULLANEY ENGINEERING, INC.

FM COVERAGE

SHELLEE F. DAVIS - WESTERVILLE, OH

CHANNEL NO. 280 FREQUENCY 103.9 MHZ
CENTER OF RADIATION 412.0 METERS AMSL
COORDINATES: 40-14-04 / 82-50-20
MAXIMUM ERP 6. KW-DA MAKE: ODD MODEL: ODD911231MA

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM) 60.0
0.	*	324.9	87.1	22.7
10.	330.5	81.5	2.999	21.9
20.	336.5	75.5	2.999	21.1
30.	344.0	68.0	2.999	20.1
40.	351.2	60.8	4.753	21.4
45.	*	353.4	58.6	21.9
50.	352.0	60.0	6.000	22.5
60.	352.8	59.2	6.000	22.4
70.	351.9	60.1	6.000	22.5
80.	349.3	62.7	6.000	22.9
90.	*	344.5	67.5	23.7
100.	343.4	68.6	6.000	23.8
110.	340.2	71.8	6.000	24.3
120.	333.9	78.1	6.000	25.3
130.	330.8	81.2	6.000	25.6
135.	*	330.3	81.7	25.7
140.	330.5	81.5	6.000	25.7
150.	328.2	83.8	6.000	26.1
160.	323.5	88.5	6.000	26.7
170.	312.5	99.5	6.000	28.2
180.	*	304.0	108.0	29.3
190.	297.2	114.8	6.000	30.1
200.	277.1	134.9	6.000	32.3
210.	272.6	139.4	6.000	32.8
220.	275.1	136.9	6.000	32.7
225.	*	275.7	136.3	32.5
230.	276.8	135.2	6.000	32.3
240.	280.6	131.4	6.000	32.0
250.	281.0	131.0	6.000	31.9
260.	279.8	132.2	6.000	32.0
270.	*	277.4	134.6	32.3
280.	277.3	134.7	6.000	32.3
290.	278.2	133.8	6.000	32.2
300.	281.3	130.7	3.783	28.6
310.	282.7	129.3	2.999	27.0
315.	*	283.5	128.5	27.0
320.	284.6	127.4	2.999	26.9
330.	290.7	121.3	2.999	26.4
340.	301.9	110.1	2.999	25.3
350.	308.3	103.7	2.999	24.6
AVERAGE (8) *	311.7	100.3 Meters		

COVERAGE TABULATION - COMPETING APPLICANTS
MM DOCKET 93-107

FIGURE 1-E

MULLANEY ENGINEERING, INC.

FM COVERAGE

WESTERVILLE BCG. CO. LTD. PTSHP. INC.

CHANNEL NO. 280 FREQUENCY 103.9 MHZ
CENTER OF RADIATION 430.0 METERS AMSL
COORDINATES: 40-11-33 / 82-45-07

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM)	
				*****	60.0
0.	*	352.0	78.0	6.	25.1
10.		364.0	66.0	6.	23.3
20.		362.7	67.3	6.	23.5
30.		363.0	67.0	6.	23.5
40.		359.2	70.8	6.	24.1
45.	*	354.0	76.0	6.	24.9
50.		347.4	82.6	6.	25.9
60.		342.1	87.9	6.	26.6
70.		342.0	88.0	6.	26.7
80.		343.1	86.9	6.	26.6
90.	*	350.1	79.9	6.	25.4
100.		361.6	68.4	6.	23.8
110.		364.3	65.7	6.	23.3
120.		342.2	87.8	6.	26.6
130.		330.1	99.9	6.	28.3
135.	*	328.8	101.2	6.	28.5
140.		330.0	100.0	6.	28.3
150.		345.3	84.7	6.	26.2
160.		353.8	76.2	6.	24.9
170.		346.6	83.4	6.	25.9
180.	*	339.8	90.2	6.	26.9
190.		332.3	97.7	6.	28.0
200.		325.2	104.8	6.	29.0
210.		316.5	113.5	6.	29.9
220.		310.4	119.6	6.	30.7
225.	*	308.4	121.6	6.	30.9
230.		304.8	125.2	6.	31.2
240.		296.3	133.7	6.	32.2
250.		293.0	137.0	6.	32.7
260.		290.5	139.5	6.	32.8
270.	*	294.5	135.5	6.	32.5
280.		296.0	134.0	6.	32.2
290.		294.2	135.8	6.	32.5
300.		300.2	129.8	6.	31.7
310.		308.3	121.7	6.	30.9
315.	*	313.2	116.8	6.	30.4
320.		317.8	112.2	6.	29.8
330.		328.2	101.8	6.	28.5
340.		333.9	96.1	6.	27.8
350.		339.2	90.8	6.	27.0
AVERAGE (8) *		330.1	99.9 Meters		

COVERAGE TABULATION - COMPETING APPLICANTS
MM DOCKET 93-107
FIGURE 1-F

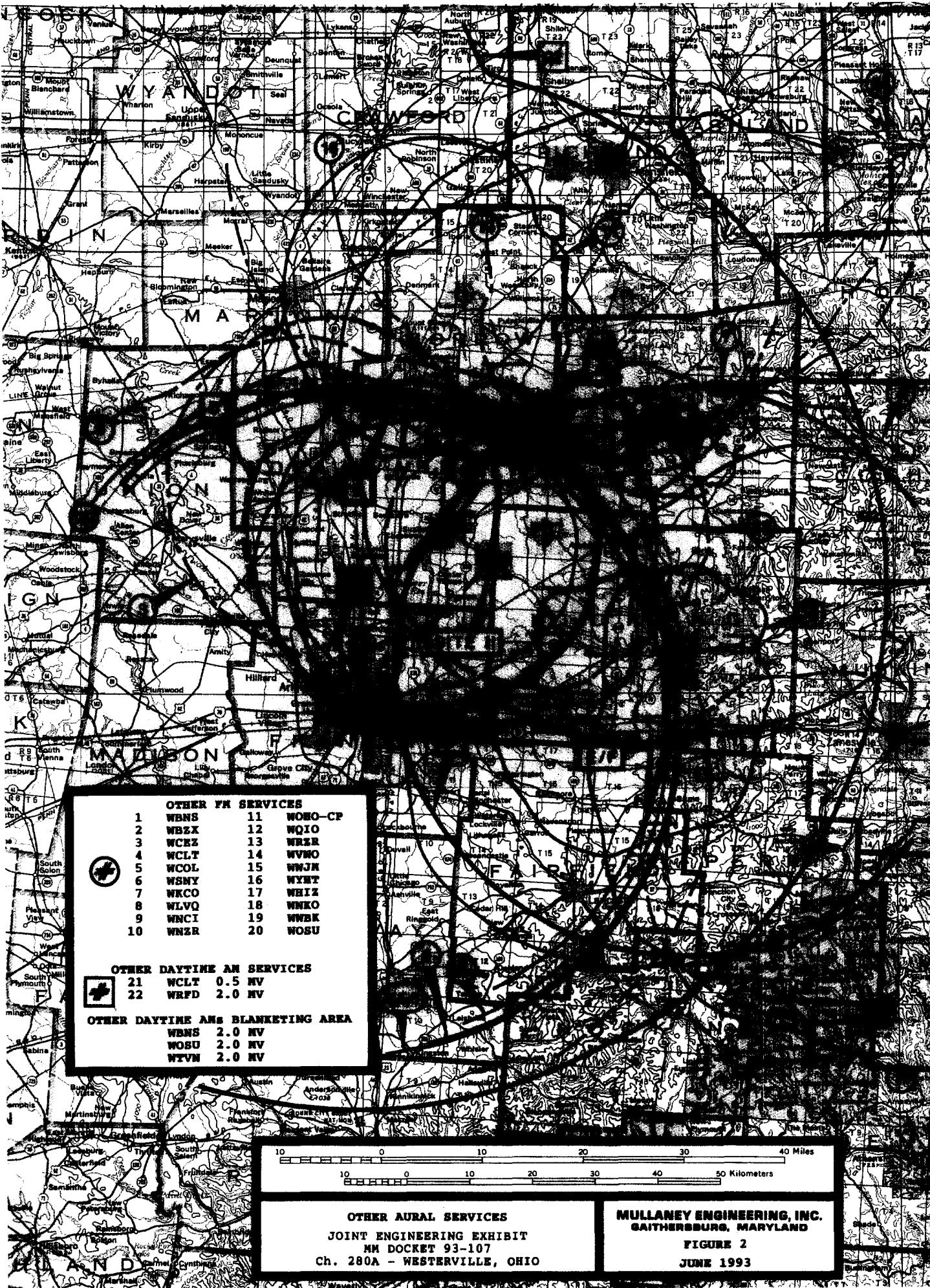
MULLANEY ENGINEERING, INC.

FM COVERAGE

OHIO RADIO ASSOCIATES INC.

CHANNEL NO. 280 FREQUENCY 103.9 MHZ
CENTER OF RADIATION 430.0 METERS AMSL
COORDINATES: 40-11-33 / 82-45-07

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM)
0.	*	352.0	78.0	6. 25.1
10.		364.0	66.0	6. 23.3
20.		362.7	67.3	6. 23.5
30.		363.0	67.0	6. 23.5
40.		359.2	70.8	6. 24.1
45.	*	354.0	76.0	6. 24.9
50.		347.4	82.6	6. 25.9
60.		342.1	87.9	6. 26.6
70.		342.0	88.0	6. 26.7
80.		343.1	86.9	6. 26.6
90.	*	350.1	79.9	6. 25.4
100.		361.6	68.4	6. 23.8
110.		364.3	65.7	6. 23.3
120.		342.2	87.8	6. 26.6
130.		330.1	99.9	6. 28.3
135.	*	328.8	101.2	6. 28.5
140.		330.0	100.0	6. 28.3
150.		345.3	84.7	6. 26.2
160.		353.8	76.2	6. 24.9
170.		346.6	83.4	6. 25.9
180.	*	339.8	90.2	6. 26.9
190.		332.3	97.7	6. 28.0
200.		325.2	104.8	6. 29.0
210.		316.5	113.5	6. 29.9
220.		310.4	119.6	6. 30.7
225.	*	308.4	121.6	6. 30.9
230.		304.8	125.2	6. 31.2
240.		296.3	133.7	6. 32.2
250.		293.0	137.0	6. 32.7
260.		290.5	139.5	6. 32.8
270.	*	294.5	135.5	6. 32.5
280.		296.0	134.0	6. 32.2
290.		294.2	135.8	6. 32.5
300.		300.2	129.8	6. 31.7
310.		308.3	121.7	6. 30.9
315.	*	313.2	116.8	6. 30.4
320.		317.8	112.2	6. 29.8
330.		328.2	101.8	6. 28.5
340.		333.9	96.1	6. 27.8
350.		339.2	90.8	6. 27.0
AVERAGE (8) *		330.1	99.9 Meters	



TITLE: SITE I - WESTERVILLE, OH - FCC REFERENCE
 LAT/LON: 40.1404 82.5020
 RADIUS: 50.0 Miles 80.5 Kilometers
 CHANNELS: 201 to 300
 TYPES: LIC CP APP
 SORTED BY: DIST

ITEM	CALL	-----CITY/STATE-----	CLASS	CHANNEL		DIST (KM)	--BEARING--			ERP (KW)	C.R. (M)	HAAT (M)
				-----	COORDINATES-----		FROM	TO	DA			
SITE I												
A	NEW	Westerville	OH APP 280 A	40 14 4.0	82 50 20.0	0.00	0.00	0.00	3	4.3	430	118
B	NEW	Westerville	OH APP 280 A	40 14 4.0	82 50 20.0	0.00	0.00	0.00	3	5.	421	109
C	NEW	Westerville	OH APP 280 A	40 14 4.0	82 50 20.0	0.00	0.00	0.00	-	2.50	422	109
D	NEW	Westerville	OH APP 280 A	40 14 4.0	82 50 20.0	0.00	0.00	0.00	1	6.	412	100
DIS	NEW	Westerville	OH APP 280 A	40 14 4.0	82 50 20.0	0.00	0.00	0.00	3	6.0	411	100
SITE II												
E	NEW	Westerville	OH APP 280 A	40 11 33.0	82 45 7.0	8.74	122.25	302.31	-	6.0	430	100
F	NEW	Westerville	OH APP 280 A	40 11 33.0	82 45 7.0	8.74	122.25	302.31	-	6.0	430	100
13	WRZR	Johnstown	OH LIC 276 A	40 13 44.0	82 39 32.0	15.33	92.26	272.37	-	1.6	483	135
	WCVO	Gahanna	OH LIC 285 A	40 4 16.0	82 48 35.0	18.31	172.22	352.24	-	3.00	395	91
3	WCEZ	Delaware	OH LIC 300 A	40 17 57.0	83 2 45.0	19.01	292.36	112.22	-	6.0	365	87
	NEW	Columbus	OH APP 204 A	40 0 59.0	83 1 1.0	28.58	212.04	31.92	-	0.63	329	79
20	WOSUFM	Columbus	OH LIC 209 B	40 1 2.0	83 1 11.0	28.62	212.54	32.42	-	50.	391	143
	WDUB	Granville	OH LIC 216 A	40 4 16.0	82 31 24.0	32.43	124.00	304.21	-	0.1		
9	WNCI	Columbus	OH LIC 250 B	39 58 10.0	83 0 10.0	32.57	205.37	25.26	1	175.	418	171
	NEW	Columbus	OH CP 298 A	39 57 46.0	82 59 46.0	33.01	203.93	23.83	-	1.90	368	126
	WCBE	Columbus	OH LIC 213 B	39 57 48.0	83 0 17.0	33.26	205.13	25.02	-	11.0	406	162
5	WCOLFM	Columbus	OH LIC 222 B	39 58 16.0	83 1 40.0	33.38	208.81	28.69	-	22.0	475	230
6	WSNY	Columbus	OH LIC 234 B	39 58 16.0	83 1 40.0	33.38	208.81	28.69	-	22.0	475	230
8	WLVQ	Columbus	OH LIC 242 B	39 58 16.0	83 1 40.0	33.38	208.81	28.69	-	18.0	475	229
1	WBNSFM	Columbus	OH LIC 246 B	39 58 16.0	83 1 40.0	33.38	208.81	28.69	-	20.5	484	238
	WRVF	Upper Arlington	OH LIC 255 A	39 58 16.0	83 1 40.0	33.38	208.81	28.69	-	3.00	340	100
2	WBZX	Columbus	OH LIC 259 B	39 58 16.0	83 1 40.0	33.38	208.81	28.69	-	20.0	484	239
10	WNZR	Mount Vernon	OH LIC 215 A	40 22 14.0	82 28 5.0	34.96	64.18	244.42	-	.100		
	WOSUFM	Columbus	OH CP 209 B	39 56 16.0	83 1 16.0	36.42	205.23	25.11	1	13.5	523	286
	NEW	Columbus	OH APP 218 A	39 56 16.0	83 1 16.0	36.42	205.23	25.11	-	.30	476	239
	NEW	Columbus	OH APP 218 A	39 56 16.0	83 1 16.0	36.42	205.23	25.11	-	0.35	523	286
	NEW	Columbus	OH APP 218 A	39 56 16.0	83 1 16.0	36.42	205.23	25.11	-	0.3	476	240
	NEW	Whitehall	OH APP 218 A	39 56 16.0	83 1 16.0	36.42	205.23	25.11	-	.255	523	286
11	WOHO	Mount Gilead	OH CP 236 A	40 34 48.0	82 48 24.0	38.47	4.05	184.07	-	3.0	457	100
	NEW	Richwood	OH APP 282 A	40 21 52.0	83 15 34.0	38.56	292.20	111.93	-	2.5	383	100
	NEW	Richwood	OH APP 282 A	40 21 52.0	83 15 39.0	38.67	292.13	111.86	-	3.0	384	100

OTHER FM SERVICES

JOINT ENGINEERING EXHIBIT
 MM DOCKET 93-107
 Ch. 280A - WESTERVILLE, OHIO

MULLANEY ENGINEERING, INC.
GAIERSBURG, MARYLAND

FIGURE 2-A Page 1 of 2

JUNE 1993

TITLE: SITE I - WESTERVILLE, OH - FCC REFERENCE
 LAT/LON: 40.1404 82.5020
 RADIUS: 50.0 Miles 80.5 Kilometers
 CHANNELS: 201 to 300
 TYPES: LIC CP APP
 SORTED BY: DIST

ITEM	CALL	-----CITY/STATE----	CHANNEL CLASS	COORDINATES			DIST (KM)	--BEARING--			ERP (KW)	C.R. (M)	HAAT (M)
								FROM	TO	DA			
12	WQIO	Mount Vernon	OH LIC 229 B	40 24 18.0	82 26 20.0	38.92	60.65	240.91	-	.37.	507	172	
18	WNKO	Newark	OH LIC 269 A	39 59 38.0	82 30 13.0	39.12	133.06	313.28	-	3.00	384	91	
	WMOO	Mount Gilead	OH APP 236 A	40 35 15.0	82 48 20.0	39.31	4.10	184.12	1	6.0	460	100	
7	WKCO	Gambier	OH LIC 220 A	40 22 25.0	82 23 45.0	40.71	67.47	247.76	-	.265	379	58	
	WMMT	Marysville	OH LIC 289 A	40 18 23.0	83 19 44.0	42.44	281.05	100.73	-	6.0	401	100	
4	WCLTFM	Newark	OH LIC 262 B	40 2 2.0	82 24 8.0	43.37	120.85	301.14	-	.50.	415	119	
19	WNBK	Fredericktown	OH LIC 252 A	40 34 27.0	82 30 27.0	47.06	36.50	216.71	-	1.80	509	129	
	WHRMFN	Marion	OH LIC 295 B	40 36 54.0	83 7 54.0	49.02	329.74	149.55	-	.25.0	393	104	
	WNCD	Grove City	OH LIC 266 A	39 48 50.0	83 3 19.0	50.22	201.58	21.44	3	6.0	333	100	
	WDIF	Marion	OH LIC 232 A	40 36 27.0	83 14 14.0	53.47	321.02	140.76	-	3.00	375	91	
	WBXL	Galion	OH LIC 272 A	40 45 26.0	82 47 23.0	58.20	4.08	184.11	-	3.5	482	131	
	WREL	Bucyrus	OH LIC 224 A	40 45 45.0	82 55 50.0	59.15	352.51	172.45	-	3.00	406	91	
	WSWZ	Lancaster	OH LIC 278 A	39 43 58.0	82 35 43.0	59.46	159.51	339.67	2	5.4	386	100	
	WAPO	Crestline	OH CP 254 A	40 46 13.0	82 45 23.0	59.91	6.65	186.70	-	1.8	476	122	
	WOSV	Mansfield	OH LIC 219 A	40 42 33.0	82 29 11.0	60.60	29.35	209.58	-	.75	514	137	
14	WNOMFM	Mansfield	OH LIC 291 B	40 45 50.0	82 37 4.0	61.71	17.55	197.69	-	.40.	545	166	
	WCXK	London	OH CP 292 A	39 53 5.0	83 25 23.0	63.18	232.16	51.78	-	3.0	413	100	
	WCXK	London	OH CP 292 A	39 53 5.0	83 25 23.0	63.18	232.16	51.78	3	6.0	414	100	
	WAHC	Circleville	OH LIC 296 A	39 39 52.0	82 51 4.0	63.30	180.95	0.94	-	3.00	361	100	
	WHDK	Lancaster	OH LIC 238 B	39 40 32.0	82 40 34.0	63.59	167.36	347.47	1	.50.	444	150	
16	WYHT	Mansfield	OH LIC 287 B	40 46 9.0	82 32 23.0	64.57	22.95	203.14	-	.50.	494	113	
	WFCD	Lancaster	OH LIC 215 A	39 40 49.0	82 35 51.0	64.90	161.46	341.61	-	.200			
	WPKO	Bellefontaine	OH CP 252 A	40 17 10.0	83 41 30.0	72.77	274.81	94.26	-	1.40	503	142	
	WYANFM	Upper Sandusky	OH LIC 240 A	40 49 30.0	83 15 6.0	74.32	332.15	151.89	-	3.00	356	91	
	WXML	Upper Sandusky	OH CP 211 A	40 50 10.0	83 14 11.0	74.82	333.47	153.21	-	3.00			
	WKKJ	Chillicothe	OH APP 227 B	39 35 30.0	83 6 38.0	75.05	198.05	17.87	1	.50.	377	150	
	WBZW	Loudonville	OH LIC 299 A	40 36 58.0	82 5 34.0	76.19	55.86	236.34	-	6.	432	100	
	WKTN	Kenton	OH LIC 237 A	40 38 41.0	83 33 59.0	76.72	306.77	126.30	-	3.00	381	84	
15	WNJH	New Lexington	OH CP 292 A	39 46 37.0	82 9 54.0	76.76	131.33	311.77	-	1.70	472	191	
	WNJH	New Lexington	OH LIC 292 A	39 46 37.0	82 9 52.0	76.79	131.31	311.74	-	3.00	382	100	
	WPKD	Bellefontaine	OH LIC 252 A	40 22 5.0	83 44 2.0	77.53	281.36	100.79	-	1.30	491	131	
	WNCOFM	Ashland	OH LIC 267 B	40 50 25.0	82 21 18.0	78.78	31.10	211.42	-	.50.	501	152	
	WPJV	Willard	OH CP 245 A	40 56 42.0	82 39 42.0	80.32	10.67	190.78	-	3.00	414	91	
	WSWR	Shelby	OH LIC 261 A	40 56 42.0	82 39 42.0	80.32	10.67	190.78	-	3.00	414	91	
17	WNIZFM	Zanesville	OH LIC 273 B	39 55 42.0	81 59 6.0	80.37	114.83	295.38	1	.50.	410	151	

DA: 1) NON-73.215 DA 2) 73.215 OMNI 3) 73.215 DA

OTHER FM SERVICES

JOINT ENGINEERING EXHIBIT
 MM DOCKET 93-107
 Ch. 280A - WESTERVILLE, OHIO

MULLANEY ENGINEERING, INC.
 GAITHERSBURG, MARYLAND

FIGURE 2-A Page 2 of 2

JUNE 1993

88888888 AM WITHIN STUDY - MULLANEY ENGINEERING, INC. GAITHERSBURG, MARYLAND - 10-JUN-93 09:15:50 88888888

TITLE: SITE I - WESTERVILLE, OH - FCC REFERENCE
LAT/LON: 40.1404 82.5020
RADIUS: 34.2 Miles 55.0 Kilometers
FREQUENCY: 540 to 1600 KHz
DAY/NITE: ALL
SORTED BY: DIST

DISTANCE (MILES)	DISTANCE (KM)	CALL	LOCATION	ITEM #888	FREQ. (KHZ)	POWER (KW)	COORDINATES	FILE NO.	AZIMUTH FROM TO
10.45	16.81	WRFD	COLUMBUS-WORTHINGTON		OH US 880 Lic	5.00 NDD CH 40.0932	83.0036	BL881117AE	240.0 59.9
10.45	16.81	WRFD	COLUMBUS-WOR.	22	OH US 880 Lic	9.00 NDD Day 40.0932	83.0036	BL881117AE	240.0 59.9
11.82	19.02	WDLR	DELWARE		OH US 1550 Lic	0.50 DA2 Day 40.1756	83.0246		292.2 112.1
11.82	19.02	WDLR	DELWARE		OH US 1550 Lic	0.03 DA2 Nit 40.1756	83.0246		292.2 112.1
17.51	28.19	WVKO	COLUMBUS		OH US 1580 Lic	1.00 DA2 Day 40.0250	83.0344	BL86112BAD	222.4 42.3
17.51	28.19	WVKO	COLUMBUS		OH US 1580 Lic	0.25 DA2 Nit 40.0250	83.0344	BL86112BAD	222.4 42.3
19.84	31.92	WBNS	COLUMBUS	23	OH US 1460 Lic	5.00 DAN Day 39.5706	82.5423		190.4 10.3
19.84	31.92	WBNS	COLUMBUS		OH US 1460 Lic	1.00 DAN Nit 39.5706	82.5423		190.4 10.3
22.40	36.05	WCOL	COLUMBUS		OH US 1230 Lic	1.00 ND1 Unl 39.5631	83.0120		205.7 25.6
23.31	37.51	WHTH	HEATH		OH US 790 Lic	1.00 DA2 Day 40.0305	82.2808	BL82011BAK	122.8 303.0
23.31	37.51	WHTH	HEATH		OH US 790 Lic	0.03 DA2 Nit 40.0305	82.2808		122.8 303.0
24.13	38.84	WWVO	MOUNT VERNON		OH US 1300 Lic	0.41 DA2 Day 40.2417	82.2623	BL880526AC	60.6 240.9
24.13	38.84	WWVO	MOUNT VERNON		OH US 1300 Lic	0.05 DA2 Nit 40.2417	82.2623		60.6 240.9
25.20	40.55	WOSU	COLUMBUS	24	OH US 820 Lic	5.00 DAN Day 39.5435	83.0323	BL881021AA	207.2 27.1
25.20	40.55	WOSU	COLUMBUS		OH US 820 Lic	0.79 DAN Nit 39.5435	83.0323	BL881021AA	207.2 27.1
25.93	41.73	WTVN	COLUMBUS	25	OH US 610 Lic	5.00 DAN Day 39.5226	82.5836	BL791010AJ	196.3 16.3
25.93	41.73	WTVN	COLUMBUS		OH US 610 Lic	5.00 DAN Nit 39.5226	82.5836	BL791010AJ	196.3 16.3
26.01	41.86	WUCO	MARYSVILLE		OH US 1270 Lic	0.50 DA2 Day 40.1446	83.1950	BL84051BAA	271.9 91.6
26.01	41.86	WUCO	MARYSVILLE		OH US 1270 Lic	0.50 DA2 Nit 40.1446	83.1950	BL84051BAA	271.9 91.6
26.07	41.96	WWNI	COLUMBUS		OH US 920 Lic	1.00 DA2 Day 39.5332	83.0251		205.1 24.9
26.07	41.96	WWNI	COLUMBUS		OH US 920 Lic	0.50 DA2 Nit 39.5332	83.0251		205.1 24.9
26.95	43.37	WLCT	NEWARK	21	OH US 1430 Lic	0.50 ND1 Day 40.0202	82.2408		120.9 301.1
26.95	43.37	WLCT	NEWARK		OH US 1430 Lic	0.05 ND1 Nit 40.0202	82.2408		120.9 301.1
30.46	49.02	WHRN	MARION		OH US 1490 Lic	1.00 ND1 Unl 40.3654	83.0754		329.7 149.5

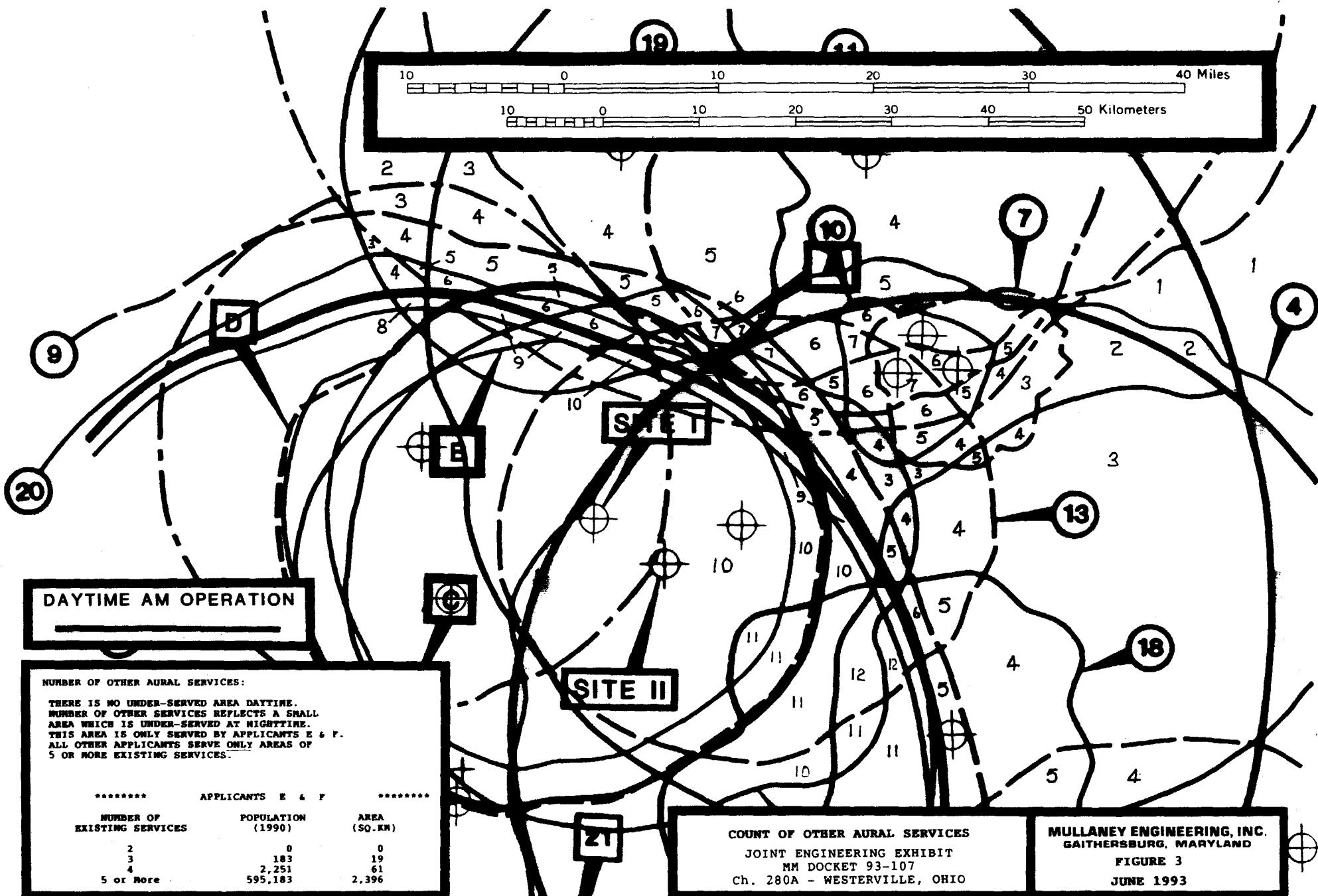
OTHER AM SERVICES

JOINT ENGINEERING EXHIBIT
MM DOCKET 93-107
Ch. 280A - WESTERVILLE, OHIO

MULLANEY ENGINEERING, INC.
GAITHERSBURG, MARYLAND

FIGURE 2-B

JUNE 1993



JOHN J. MULLANEY
JOHN H. MULLANEY, P.E.

MULLANEY ENGINEERING, INC.

9049 SHADY GROVE COURT
GAIITHERSBURG, MD 20877

301 921-0115

APPENDIX I:

**COVERAGE TABULATIONS
OF
OTHER AURAL SERVICES**

JUNE 21, 1993

**JOINT ENGINEERING EXHIBIT
MM DOCKET 93-107
CH. 280A - WESTERVILLE, OHIO**

APPENDIX I - COVERAGE TABULATION - OTHER SERVICES
MM DOCKET 93-107 FIGURE 1

MULLANEY ENGINEERING, INC.

FM COVERAGE

WBNS-FM - COLUMBUS, OH

CHANNEL NO. 222 B FREQUENCY 92.3 MHZ
CENTER OF RADIATION 484.0 METERS AMSL
COORDINATES: 39-58-16 / 83-01-40

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM) 60.0
0.	*	242.9	241.1	52.6
10.	258.0	226.0	20.5	51.3
20.	264.8	219.2	20.5	50.9
30.	258.0	226.0	20.5	51.3
40.	249.6	234.4	20.5	52.0
45.	*	248.2	235.8	52.1
50.	248.2	235.8	20.5	52.1
60.	250.3	233.7	20.5	52.0
70.	249.3	234.7	20.5	52.1
80.	244.5	239.5	20.5	52.5
90.	*	240.6	243.4	52.8
100.	233.8	250.2	20.5	53.3
110.	226.4	257.6	20.5	53.8
120.	222.2	261.8	20.5	54.1
130.	219.7	264.3	20.5	54.2
135.	*	217.5	266.5	54.4
140.	216.1	267.9	20.5	54.6
150.	215.0	269.0	20.5	54.6
160.	214.4	269.6	20.5	54.6
170.	217.3	266.7	20.5	54.4
180.	*	213.4	270.6	54.7
190.	223.8	260.2	20.5	53.9
200.	236.5	247.5	20.5	52.9
210.	241.8	242.2	20.5	52.6
220.	248.1	235.9	20.5	52.1
225.	*	250.9	233.1	52.0
230.	254.8	229.2	20.5	51.7
240.	261.5	222.5	20.5	51.2
250.	263.6	220.4	20.5	51.0
260.	264.7	219.3	20.5	50.9
270.	*	265.6	218.4	50.9
280.	269.1	214.9	20.5	50.5
290.	266.3	217.7	20.5	50.7
300.	260.7	223.3	20.5	51.2
310.	256.5	227.5	20.5	51.5
315.	*	256.3	227.7	51.5
320.	253.6	230.4	20.5	51.8
330.	246.8	237.2	20.5	52.3
340.	258.7	225.3	20.5	51.3
350.	245.8	238.2	20.5	52.3
AVERAGE (8) *		241.9	242.1 Meters	

APPENDIX I - COVERAGE TABULATION - OTHER SERVICES
MM DOCKET 93-107

FIGURE 2

MULLANEY ENGINEERING, INC.

FM COVERAGE

WBZX - COLUMBUS, OH

CHANNEL NO. 222 B FREQUENCY 92.3 MHZ
CENTER OF RADIATION 484.0 METERS AMSL
COORDINATES: 39-58-16 / 83-01-40

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM)
0.	*	242.9	241.1	20. 52.3
10.		258.0	226.0	20. 51.2
20.		264.8	219.2	20. 50.7
30.		258.0	226.0	20. 51.2
40.		249.6	234.4	20. 51.8
45.	*	248.2	235.8	20. 52.0
50.		248.2	235.8	20. 52.0
60.		250.3	233.7	20. 51.8
70.		249.3	234.7	20. 51.8
80.		244.5	239.5	20. 52.1
90.	*	240.6	243.4	20. 52.5
100.		233.8	250.2	20. 52.9
110.		226.4	257.6	20. 53.6
120.		222.2	261.8	20. 53.8
130.		219.7	264.3	20. 54.1
135.	*	217.5	266.5	20. 54.2
140.		216.1	267.9	20. 54.2
150.		215.0	269.0	20. 54.4
160.		214.4	269.6	20. 54.4
170.		217.3	266.7	20. 54.2
180.	*	213.4	270.6	20. 54.4
190.		223.8	260.2	20. 53.8
200.		236.5	247.5	20. 52.8
210.		241.8	242.2	20. 52.5
220.		248.1	235.9	20. 52.0
225.	*	250.9	233.1	20. 51.7
230.		254.8	229.2	20. 51.5
240.		261.5	222.5	20. 50.9
250.		263.6	220.4	20. 50.7
260.		264.7	219.3	20. 50.7
270.	*	265.6	218.4	20. 50.5
280.		269.1	214.9	20. 50.4
290.		266.3	217.7	20. 50.5
300.		260.7	223.3	20. 51.0
310.		256.5	227.5	20. 51.3
315.	*	256.3	227.7	20. 51.3
320.		253.6	230.4	20. 51.5
330.		246.8	237.2	20. 52.0
340.		258.7	225.3	20. 51.2
350.		245.8	238.2	20. 52.1

AVERAGE (8) * 241.9 242.1 Meters

APPENDIX I - COVERAGE TABULATION - OTHER SERVICES
MM DOCKET 93-107 **FIGURE 3**

MULLANEY ENGINEERING, INC.

FM COVERAGE

WCEZ - DELAWARE, OH

CHANNEL NO. 300 A FREQUENCY 107.9 MHZ
CENTER OF RADIATION 365.0 METERS AMSL
COORDINATES: 40-17-57 / 83-02-45

BEARING DEGREES	3-16 KM AVERAGE	C.R. HAAT	E.R.P. (KW)	DISTANCE TO CONTOURS (KM)	
				60.0	
0.	*	274.3	90.7	6.	27.0
10.		276.5	88.5	6.	26.7
20.		283.5	81.5	6.	25.7
30.		288.5	76.5	6.	24.9
40.		290.0	75.0	6.	24.8
45.	*	289.0	76.0	6.	24.9
50.		287.1	77.9	6.	25.1
60.		283.7	81.3	6.	25.6
70.		284.9	80.1	6.	25.4
80.		285.7	79.3	6.	25.4
90.	*	285.7	79.3	6.	25.4
100.		284.6	80.4	6.	25.6
110.		280.4	84.6	6.	26.1
120.		276.0	89.0	6.	26.7
130.		280.2	84.8	6.	26.2
135.	*	280.7	84.3	6.	26.1
140.		278.9	86.1	6.	26.4
150.		278.6	86.4	6.	26.4
160.		280.9	84.1	6.	26.1
170.		275.0	90.0	6.	26.9
180.	*	263.9	101.1	6.	28.5
190.		268.3	96.7	6.	27.8
200.		274.3	90.7	6.	27.0
210.		274.3	90.7	6.	27.0
220.		274.7	90.3	6.	27.0
225.	*	274.5	90.5	6.	27.0
230.		275.0	90.0	6.	26.9
240.		275.7	89.3	6.	26.9
250.		274.9	90.1	6.	26.9
260.		276.0	89.0	6.	26.7
270.	*	277.0	88.0	6.	26.7
280.		275.1	89.9	6.	26.9
290.		274.3	90.7	6.	27.0
300.		274.3	90.7	6.	27.0
310.		274.3	90.7	6.	27.0
315.	*	274.3	90.7	6.	27.0
320.		274.3	90.7	6.	27.0
330.		274.3	90.7	6.	27.0
340.		274.3	90.7	6.	27.0
350.		274.3	90.7	6.	27.0

AVERAGE (8) * 277.4 87.6 Meters